# Fundamentals of Data Analysis: Assignment #12

Deadline: 1/26/2004 (Monday)

Please post to the mailbox next to the IS management office (2nd floor of IS building)

1. **Assume that you teach an undergraduate basic mathematics course. You teach the 1st, 2nd (sophomore), 3rd (junior) and 4th-year (senior) students, and you teach classes in both the morning and the afternoon. You randomly select 40 students (5 students from each combination of time and grade level) and analyze their final-exam scores shown in the table below. Run a two-way ANOVA with respect to two factors A (time of the course) and B(grade level), according to the following steps.**

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| AM | 80 | 85 | 90 | 98 |
| | 80 | 80 | 89 | 97 |
| | 75 | 80 | 89 | 95 |
| | 70 | 83 | 87 | 95 |
| | 70 | 82 | 87 | 93 |
| PM | 70 | 75 | 84 | 93 |
| | 70 | 71 | 80 | 81 |
| | 65 | 70 | 80 | 80 |
| | 60 | 69 | 78 | 79 |
| | 60 | 65 | 73 | 79 |

   a. Calculate the mean for each combination of time and grade level, and plot the results.
   b. Calculate the sum of squares SSA, SSB, SSAB, SSW and SST, and check that SST equals to the sum of other four terms.
   c. Calculate the mean squares MSA, MSB, MSAB, and MSW.
   d. Calculate the F values and p values for the main effect of factor A, the main effect of factor B, and their interaction, and test the null hypotheses. Summarize the results of the tests in the table form.

2. **You run a psychophysical experiment with 6 participants, for comparing the scores in three conditions, using within-subject design. The results are summarized in the table. Analyze the data according to the following steps.**

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $\alpha$ | 8 | 8 | 9 | 0 | 13 | 10 |
| $\beta$ | 12 | 13 | 15 | 18 | 15 | 17 |
| $\gamma$ | 9 | 14 | 6 | 12 | 18 | 7 |

   a. Plot the data in a figure whose horizontal and vertical axes represent participant index and the score, respectively.
   b. Calculate the sum of squares SSA and SSAB.
   c. Calculate the mean squares MSA and MSAB.
   d. Judge whether the effect of the experimental condition is significant or not, using a F-test.

3. **Write your comments and requests on this lecture (if any).**

**END.**